SIEMENS

Mammomat 300

SP

Maintenance Instructions

The maintenance protocol
RXB7-120.105.01.02.02
is required for this instructions

English
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1 General information

1.1 Training

- Self-instruction packet or training workshop and at least 1 installation

1.2 Required documents

• MAMMOMAT 300 circuit diagram	RX B7-120.051.01...(X041E)
• Installation and adjustment instructions	RX B7-120.033.01...
• Service instructions	RX B7-120.061.01...
• Maintenance protocol	RX B7-120.105.01...
• Operating instructions	RX B7-120.201.03...

1.3 Required tools, measurement and auxiliary devices

NOTICE **All tools, measurement and auxiliary devices used, with the exception of "standard installation tools", are specified in ARTD (part 3).**

- Oscilloscope
- Digital multimeter
- mAs meter
- Service PC with connection cable
- SIB phantom or Normi 7 or 4 cm Plexi or customer phantom
- Sensitometer / Densitometer
- Film pack 24x30 or larger
- Cleaning agents specified in the operating instructions
- Protective conductor meter
- Spring scale 0-25kp (1kp increments) with cord
- Water level
- Laquer according to the PG (to touch up chipped paint)
- Standard installation tools
- Electric screwdriver with sockets (recommended)

1.4 Required lubricants

- All purpose grease PD2
- Viscogen oil

1.5 Text emphasis

⚠WARNING	"Warnings" are information provided with special emphasis when there is the potential for personal injury to the operator or patient.
CAUTION	"Cautions" are information provided with special emphasis when there is the potential for damage to the equipment.
NOTICE	"Notices" are information provided with special emphasis to facilitate proper use of the equipment or proper execution of a procedure.

Safety Information and Preventive Measures

CAUTION

- When completing repair work and tests, please note:
  - the product-specific safety information in the document,
  - the safety information in RA0-000.012.40... , as well as
  - the safety information contained in the TI folder in Register 2 .
- When the system is switched off via the operating panel or S2/ D711, line voltage is still present at the line voltage connection for the generator, at the line voltage filter Z1, at transformer T1, at transformer T10, and on board D711 (refer to circuit diagram).
- After switching off the system, approximately 380V DC may be present in the intermediate circuit as indicated by the V24 LED on board D710. Within 3 minutes, the voltage will drop to less than 30 V, and the LED will go out.
- Tests or adjustments that must be made with radiation switched on are identified with the radiation warning symbol ☢ .
  During these types of adjustments, radiation protective clothing must be worn.

2 System

2.1 Checks

PMP Radiation protection

- Check the radiation protection shield for possible damage(1/Fig.1).
- Information regarding the lead equivalent value must be legible.

SIM Swivel arm / PPS tube - attachment

- Check the swivel arm / PPS tube - attachment by pulling on both support rails (minimum play of approximately +/- 2° is correct). (2/Fig.1).

SIM Basic table

- Check the mounting of the basic table as well as the locking mechanism for the exposure system 3/Fig.1).

SIM Level

- Verify that the system is level with respect to the floor. Check the level screws (4/Fig.1) with a water level and, if available, the floor mounting(optional).

PMP Head guard and compression fixtures

- Check the head guard and compression fixtures for correct seating and for damage (5/Fig.1).

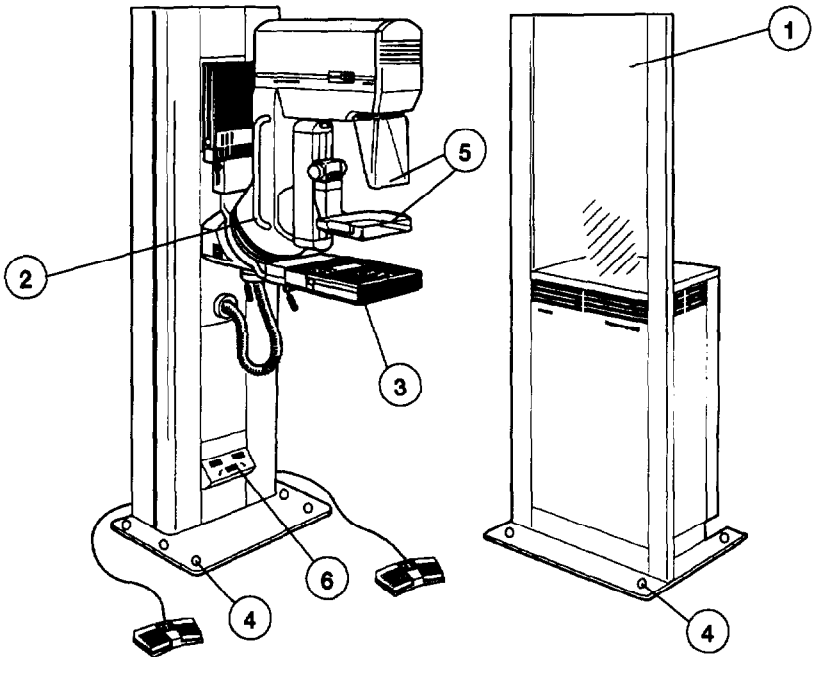

Fig. 1

2.2 Preparations

SIE Cables

- System OFF
- Check the condition of the cables and the corrugated tubing (3/Fig.2) while removing the following covers (refer also to the Service Instructions, chapter 2):
  - X-ray tube covers (left, right and front) (1, 2/Fig. 2)
  - all lateral covers of the stand (5,6,8/Fig. 3)

CAUTION **Attach protective strips.**

- Generator front cover(3/Fig. 4).

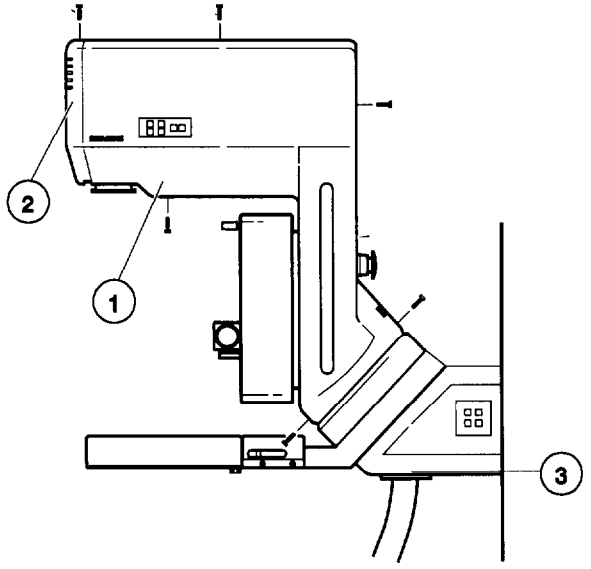

Fig. 2

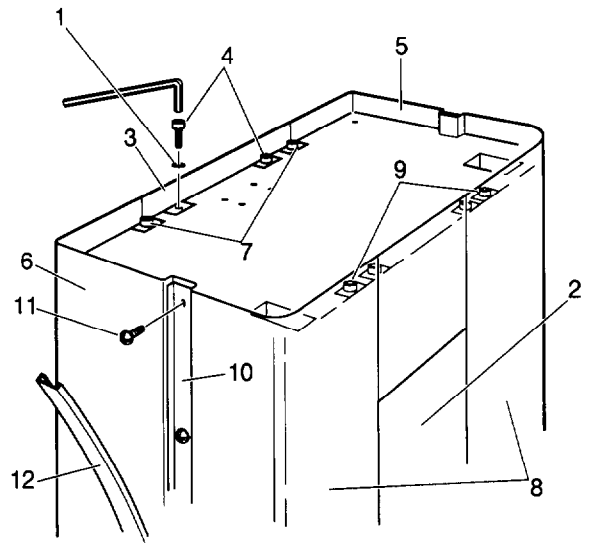

Fig. 3

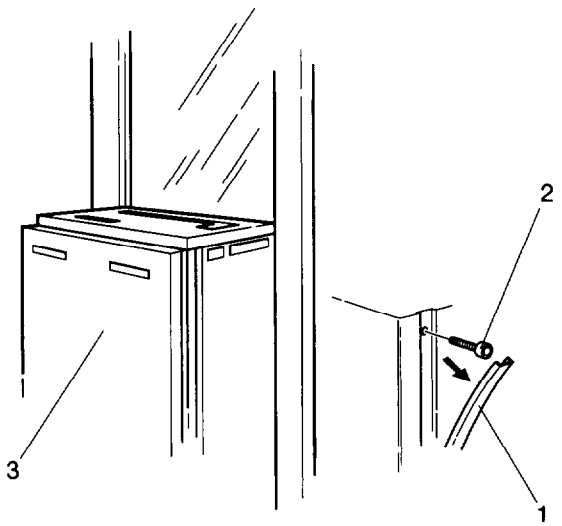

Fig. 4

3 Column stand

3.1 Checks

SIM Steel ropes

- Do the steel ropes (balancing and flap),the drive belt, the suspension or the pulleys show any damage (e.g. fraying or splitting) or sign of wear?

PMA Oil and grease

- If they are okay, lightly oil the wire cable and grease the rails, then remove the protective strips.

SIE Limit switches

- Switch ON the system and move the lifting carriage up and down several times.
- Do the limit switches stop the carriage travel at the top and at the bottom?
- Activate safety switch S882. System movements must be blocked.

PMF Vertical travel

- Is the vertical travel smooth and noise-free?
- Switch OFF the system and attach the protective strips once again.

SIM Safety catch and rotation safety catch

- Do the safety catch (1/Fig. 1) and rotation safety catch (2/Fig.1) show any visible damage? Are the springs in good condition?

SIM Mounting for the X-ray tube

- Check the mounting for the X-ray tube unit (1/Fig. 2).

PMA Grease the grid spindle

- Remove the patient tabletop from the from the grid table and lightly grease the grid spindle (1/Fig. 3).
- Reattach the patient tabletop.

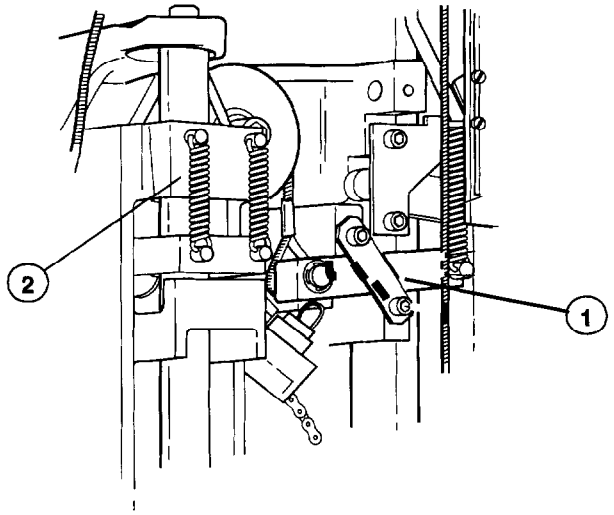

Fig. 1

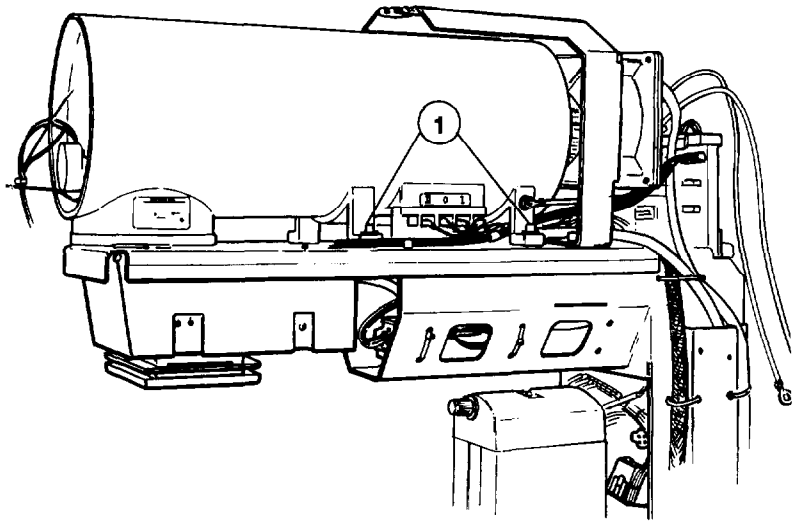

Fig. 2

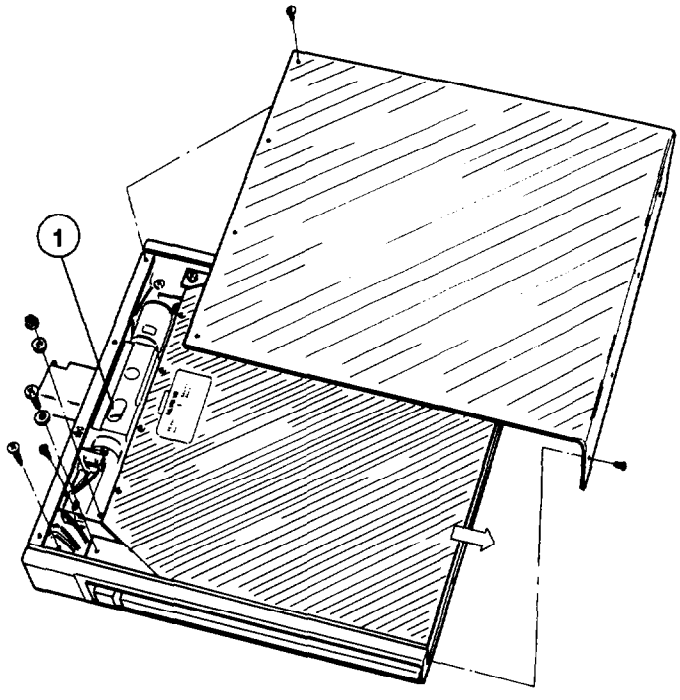

Fig. 3

4 Compression and System Movements

4.1 Testing the "compression" function

- Attach the spring scale as shown in 1/Fig. 1 and make sure not to damage the compression plate during the following tests:
  Tolerance: +/- 1 kp.

4.1.1 Switching off

- System ON

PMF Presetting

- Select any value (e.g. 6 kp) on the potentiometer (2/Fig. 1).
  Does the compression unit switch off at that setting?

SIE Max. value switch off

- Select the maximum value (20 kp) with the potentiometer (2/Fig. 1).
  (20 kp).Does the unit switch off when it reaches the maximum value?
- Correct display (refer to chapter 2: 6/Fig.1)

PMF OPCOMP

- With your lower arm, check the OPCOMP function (optional).

  ➪ Typically, the cutoff value is between 6 and 10 kp with the factory setting. This value must remain constant (tolerance +/- 1 kp).

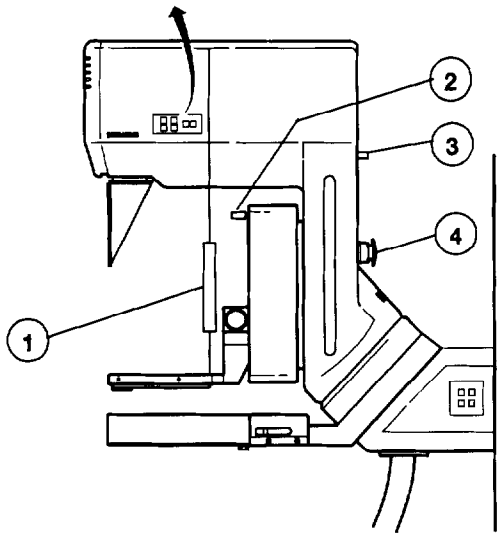

Fig. 1

4.2 Testing the "decompression" function

- Attach the spring scale as shown in 1/Fig. 2. Tolerance: +/- 1 kp.

4.2.1 Switching off

SIE Safety Switch

- Does decompression cut off at approximately. 5 kp counter pressure?

  ➪ Because of the location of measurement, this value corresponds to a value of approximately. 3 kp at the compression plate.

4.2.2 Travel

PMF Compression travel

- Is compression travel smooth and noise-free?

4.2.3 Applying Oil and Grease

PMA Oil and grease the compression unit

- System OFF
  Remove the upper and lower covers.
  (snap closures, 2/Fig.2)
- After removing the "small" Allen screws (two above and two below), the right cover of the compression unit can be removed.
- Grease the rails lightly and check the belt and string (Fig.2b) for damage / wear as well as for tension.
- Reinstall the covers on the compression unit.

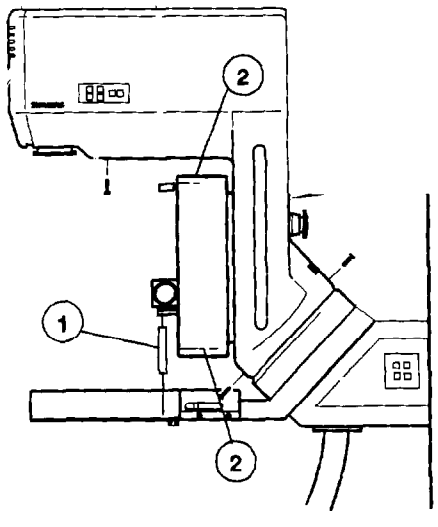

Fig. 2

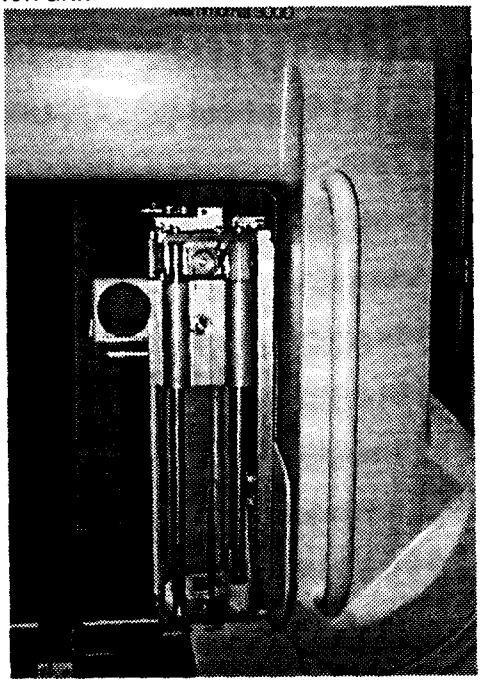

Fig. 2b

4.3 Compression Thickness Display

PMF Thickness indicator

- Move the compression unit to its full height and measure the height.

  ⇨ The value displayed (refer to chapter 2: 6/Fig.1) must agree with the value measured.

4.4 Checking miscellaneous system movements

4.4.1 Check

- System ON.

SIE Switch off

- Check whether the motorized rotation movements shut off when a preset angle is reached.
  (potentiometer 3/Fig. 1, e.g. 90°).
- Check the switch off function in the 0° position as well.

PMF Rotation movements

- Is the rotation smooth and noise-free?
- Is the display correct (refer to chapter 2: 6/Fig.1)?

SIM Blocking the rotation and vertical travel

- Rotation and vertical travel must be blocked at a compression force of > 3 kp.

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5 Test exposures

- System OFF
- Connect the following measurement devices:
  - Service PC to D702.X990
  - Oscilloscope to MP kVactual .X711 (1V ≙ 5kV) and mAactual X707, OVA.X708 (1V ≙ 40mA)
  - mAs-Meter to D710 (remove X3 - X4 jumpers)
  - Multimeter to H3 (-) and G (+) (measurement range 200V=)
- System ON

- Test the kV/mA control loop according to Installation / Adjustment instructions, chapter 12 "High voltage tests".

5.1 Evaluating test values

PMF Tube assembly boost

- Evaluate the tube assembly boost (acoustic).

PMF kV and mA

- Do the measured kV and mA values agree with the values selected?

PMF mAs selection

- Do the measured mAs values agree with the values selected?

PMF mAs value displayed

- Does the mAs value measured agree with the mAs value displayed (for Iontomat)?

PMF Grid voltage

- Does the grid voltage measured (small focus) agree with the value in the test protocol?

  ⇨ This voltage is only present when the "green" (exposure ready) indicator lights up.

PMF Signal lamp

- Does the radiation-ON indicator light up?

5.2 Testing dose rate control

- Cover the measurement field (e.g.with a lead apron) and release an exposure.

PMF Dose rate control

- Does dose rate control switch the exposure off after approximately 100 ms?

5.3 Testing the radiation field / light field

PMF Format collimation

- Proceed with the test according to the Installation / adjustment instructions, chapter 18 "Testing the radiation field".

5.4 Testing image quality

- Attach the most frequently used exposure system (e.g. grid table 18 x 24).
- Load the "test cassette" with film and insert it.
- Position the SIB phantom over 2 cm Plexiglas or other IQ phantom (e.g.Normi 7).
- Select the most frequently used kV value, Iontomat and automatic decompression.

- Compress somewhat and release an exposure.

PMF Automatic decompression

- Does decompression occur immediately following the end of the exposure?

5.5 Evaluating the films

QIQ Phantom exposures

- In addition, expose a sensitometer strip and develop the exposure.
- Compare the phantom exposures with those on hand and / or archive them for the next maintenance as starting values.

6 Miscellaneous

6.1 Blocking exposure release

PMF Blocking

Exposure release must be blocked under the following conditions: (indicated on the control console):

- No cassette is inserted.
- Cassette was not changed after the last exposure.
- Table is not attached, or not locked in place.
- For film format 18x24: no metal plate for beam limitation in the collimator.
- The two exposure release switches were not pressed simultaneously.

6.2 Checks

SIE Emergency STOP

- Press Emergency STOP(4/Fig. 8).
  - Are compression, rotation and vertical travel of lifting carriage blocked?
- Release Emergency STOP.

PMF Indicators

- Check the LED`s on the operating console by starting an LED test (refer to the service instructions, chapter 7, D740.S23 (right))

PMP Error memory

- Read out the error memory and the exposure counter with the Service PC.

PMP Record the error memory

PMP Delete the error memory

- Enter the data of the exposure counter and the error memory in the protocol and delete the error memory o n l y.

PMF Auxiliary voltages

- With the voltmeter, measure the auxiliary voltages according to circuit diagram X041E, sheet 2-8/9 (test points on D801, D802 and D704).
- System OFF

PMA High voltage cable and plug:

NOTICE

DIN VDE 0750 section 21 (IEC 601-2-7) paragraph 16:

"Movable high voltage cables that conduct X-ray tube voltage must be provided with flexible conductive shielding which has a maximum resistance of 10 Ohm.
The shielding must be connected to the metal housing of the high voltage source H1 (X-ray generator) as well as the X-ray tube."

⚠WARNING

Wait until the LED V24 on D710 goes out (approx. 3 min.).

- Disconnect the high voltage cable from the receptacle at the generator and measure the braided shield resistance against ground. When doing this flex the cable, especially the bends and loops.

NOTICE

Replace high voltage cables whose shield resistance exceeds a maximum of 1 Ohm/m. The length of the high voltage cables is 10 m.

- Check the high voltage cable plug and the high voltage receptacle for damage (burn marks, cracks).
- Reinstall the cables.
- Check that the high voltage plug is firmly seated.

PMF Cassette locking

- Check that the cassettes used lock in properly to the object tables.

PMA UI's and SPEED Infos

- Check whether all relevant UI's and SPEED Infos have been completed.

6.3 Final tests

- Remove the measurement devices.

PMF Operating problems

- Were there any operating problems during the checks?

PMP Covers

- Remove the protective strips and reinstall all covers. Check that all covers are complete and firmly seated, including the cable duct.

SIE Protective conductor test

- Perform the protective conductor test according to TI 236.

PMP Cleaning / Damaged paint

- Clean the unit using the materials recommended in the operating instructions and repair any damaged paint.
- System ON.

QSQ Final test exposure

- Take one final test exposure.

TDSP 2 / Am-Ende
TDSP 1 / Groß
SMS Iselin / Fear

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7 Changes to previous version

New layout

New work steps

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